LaserMate™ Power Meter

User Manual

COHERENT®
AUBURN GROUP

LaserMate™ Power Meter
User Manual

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LaserMate™ Power Meter

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LaserMate™ Power Meter

General

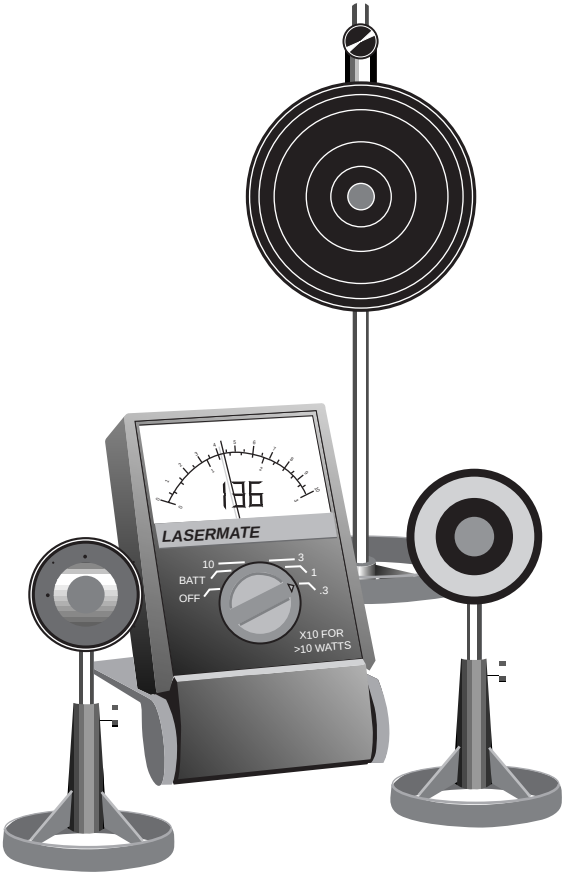


Figure 1. LaserMate Power Meter

The LaserMate Power Meter incorporates Coherent's proven power meter design and patented thermal sensor technology in an inexpensive, compact package. The LaserMate is available with a choice of five detectors, to measure laser power from 10 mWatt to 100 watts. The standard LaserMate uses a fast response analog needle. An optional digital display can be added to combine the tuning capability of an analog with the precision of a digital display.

General

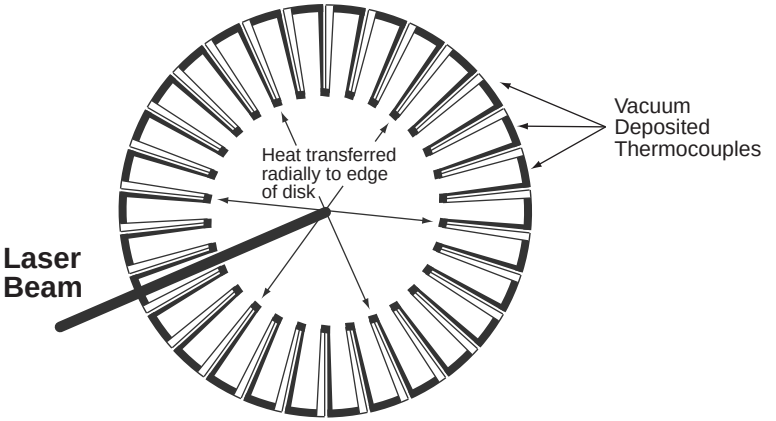


Figure 2. Coherent Thermal Disk Sensor

Thermal Disk Sensor

Coherent's patented Thermal Disk Sensor makes LaserMate Power Meters inherently insensitive to beam position, therefore requiring less setup time and no critical alignment.

At the heart of the Thermal Disk Sensor is an array of vacuum deposited thermocouples. Each thermocouple produces a voltage proportional to its temperature differential.

When the thermocouples are at the same temperature, the sum of the voltages produced is zero. When the thermal disk is heated by laser energy, heat is transferred radially from the center of the disk to the disk edge, crating a temperature gradient.

Due to this temperature gradient, voltages are produced by each thermocouple, the sum of which is proportional to the amount of laser power striking the disk.

The radically symmetrical design of the Thermal Disk Sensor automatically compensates for beam displacement and eliminates the need for critical beam alignment.

LaserMate™ Power Meter

General

Features

- Analog meter movement – provides the speed and real time feedback you need for laser tuning.
- Optional digital back plane – adds the precision of digital readout to the speed and responsiveness of the analog display.
- Accuracy – The Thermal Disk Sensor provides ±5% accuracy (directly traceable to N.I.S.T. standard).
- Service – Annual calibration to maintain accuracy and traceability is available worldwide from service centers in Japan, Germany and the United States.
- Flexibility – The LaserMate detector heads incorporate the technical advantages of Coherent's Thermal Disk Sensor. Because the sensor is inherently insensitive to beam position, there is no critical alignment, allowing faster set-up and extremely flexible operation.
- Reliability – The LaserMate is based on the first laser power meter introduced by Coherent over 25 years ago. There have been more Coherent Thermal Disk power meters sold than all other brands combined. Coherent meters have a worldwide reputation for accuracy and dependability under all conditions.
- Portability – The LaserMate Console is compact and light weight, making it easy to transport and use when space is at a premium.
- Ease of use – The LaserMate Console can be tilted over a wide angle and has a large meter movement for clear viewing. Range selection, battery test and zero adjustment are provided by knobs on console.
- Broad wavelength range – The Thermal Disk Sensor provides flat spectral response from 0.3 to 10.6 μm.
- AC/DC operation (with optional battery eliminator).

Unpacking & Setup

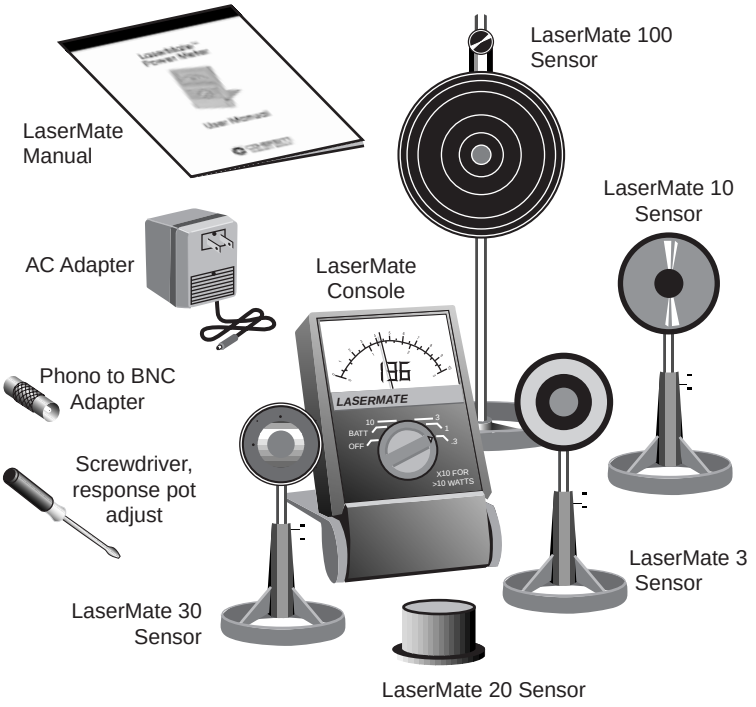


Figure 3. Unpacking

LaserMate Power Meters are shipped in foam inserts. Detector heads are shipped in the same carton as the LaserMate Console, except the 100 watt detector which is shipped separately.

Batteries are installed in the LaserMate Console prior to shipment. An optional AC adaptor is available.

Visually check cartons and contents for damage before unpacking. Advise Coherent of any damage immediately and a Returned Material Authorization will be issued for the instrument (see p. 14 for service). Remove all components from carton.

Plug the detector head into the 3.5 mm diameter detector socket in side panel of the console. (Fig. 5)

Plug the optional AC adaptor into the appropriate socket on the LaserMate side panel. (Fig. 5)

Opening the Cover

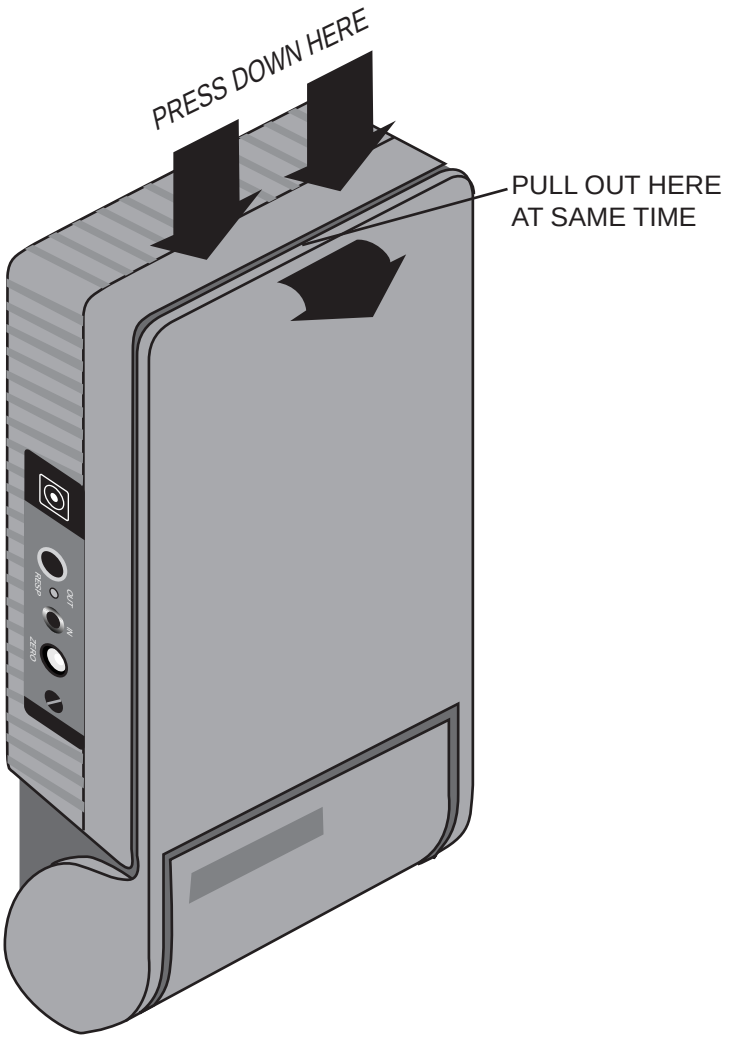


Figure 4. Opening the Cover

The protective cover of the LaserMate is held shut by two catches inside the top of the case. To release the catches, press down on the top of the case and simultaneously pull outward on the cover. NOTE: This may require some force the first few times the unit is opened. Continue pulling down on the cover and turn it all the way under the body to form the stand for the LaserMate.

Controls & Connections

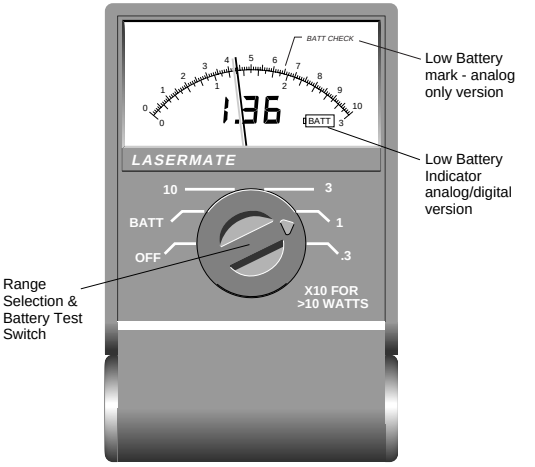


Figure 5. LaserMate Console Front Panel

Front Panel

Range Selection Switch

Rotary switch turns meter on and off and selects power range. Positions for each range are marked on the front panel. For the LaserMate 20, 30 and 100, multiply the range on the panel by 10.

LaserMate	1 Switchable		3	10	20	30	100	150 Switchable	
Ranges (Full scale, watts)	0.003	0.03	0.3	0.3	3.0	3.0	3.0	3.0	30
	0.01	0.1	1.0	1.0	10	10	10	10	100
	0.03	0.3	3.0	3.0	30*	30	30	30	300
	0.1	1.0		10	100*	100*	100	100	

Battery Test

In this position the meter top scale indicates the battery voltage in volts. Batteries should be replaced when the voltage is below 6.5 volts. (This level is indicated by the “BATT CHECK” line on the analog only version. On the analog/digital version a “BATT” warning icon is displayed on the back plane when voltage is < 6.5 volts)

* Note that although the scale is available on these, the detectors are rated only to 20, 30, and 150 watts CW respectively. **Exceeding this maximum will cause damage to the detector.**

Controls & Connections

Side Panel

Power Supply

Plug Coherent's Auxiliary Power Supply in power supply socket. Use only Coherent ±9 VDC supply. (Coherent Part Number 4001-0156, 110 VAC or 4001-0158, 220 VAC). Use of other power supplies may damage unit.

Analog Output

The RCA phono jack connector provides a 0 to 1 volt (nominal) analog signal (uncalibrated) corresponding with zero to full scale of the meter movement. It can be used to operate a strip-chart recorder.

Meter Response Adjustment

The response pot can be adjusted using the screwdriver provided with the LaserMate. This adjustment regulates the speed of response vs. the needle overshoot (the faster the response, the greater the overshoot). Response is preset at the factory for the optimal balance for most applications.

Detector Socket

Plug detector head into detector socket on side panel. Any LaserMate detector can be used with the LaserMate console. Detectors from the older 200 Series Power Meters may also be used with the LaserMate console. However, in order for the decimal point in the optional digital display to be placed correctly, the connector on 20, 30 and 100 watt detectors must be changed at the factory.

Zero Adjustment Control

Zero Adjustment Control adjusts meter movement to zero. This is used to cancel ambient light level and insure accurate measurements.

Controls & Connections

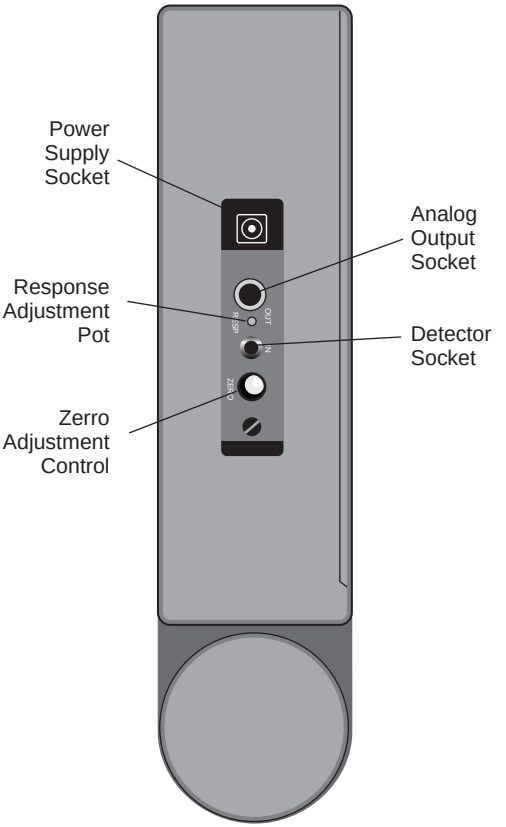


Figure 6. LaserMate Console Side Panel

Operation

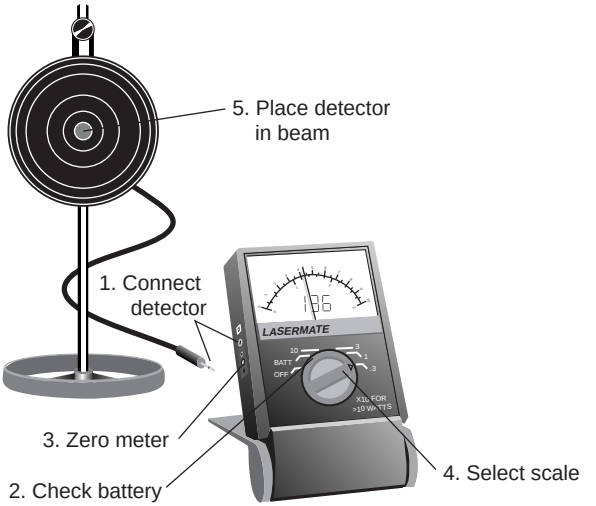


Figure 7. LaserMate Operation

To operate the LaserMate Power Meter:

1. Connect the sensor head to the socket on the side panel of the console.
2. Turn the selector switch to BATT and check that the meter reading is > 6.5 on the upper scale.
3. Zero the meter at the highest range to be measured. NOTE: For maximum accuracy when using the optional digital display, the meter must be zeroed at the range being used.
4. Turn the selector switch to the appropriate scale.
5. Place the detector head in front of the beam and read the output on the meter.

Meter Accuracy – Digital Option

If the analog needle is over range (pegged), the digital reading is not accurate. The proper range must be selected for accurate analog and digital readings.

Laser Damage

All sensors will be damaged if the specified maximum power density is exceeded. Check the maximum power density for your detector head. Expand the beam if necessary.

Battery Replacement

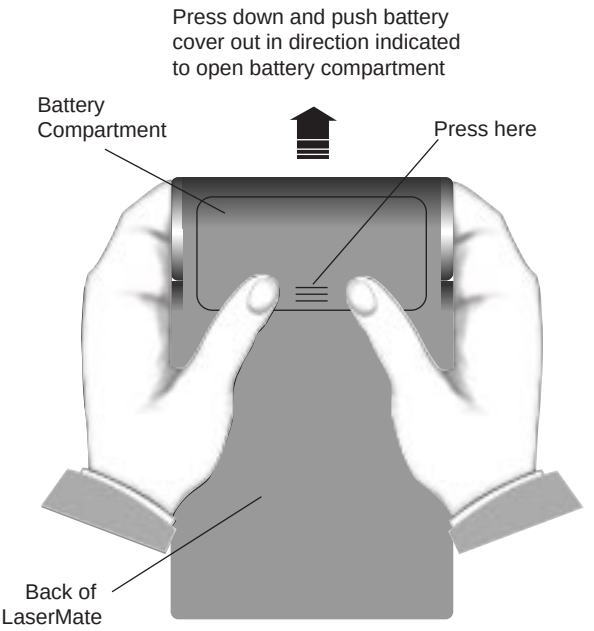

Press down and push battery cover out in direction indicated to open battery compartment
Battery Compartment
Press here
Back of LaserMate

Figure 8. Battery Replacement

The LaserMate Power Meter operates with either an AC adapter or with two standard 9 volt transistor batteries (Duracell MN1604 or equivalent). Batteries are contained in the battery compartment at the bottom rear of the LaserMate console.

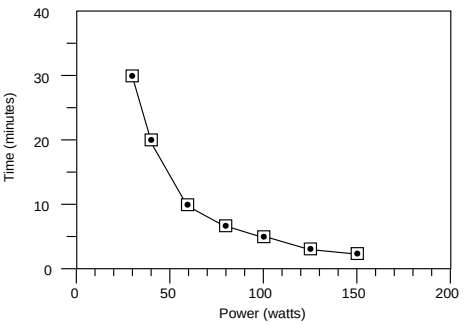
To change batteries, turn the console over and open the battery compartment (Fig. 7). Replace the batteries and close the compartment. Battery power is not used when the AC adapter is plugged in.

LaserMate™ Power Meter

Specifications

LaserMate Model	1	3	10	20	30	100	150
Spectral Sensitivity	0.25 to 1.5µm	0.25 to 10.6 µm					
Meter Ranges (Full Scale)	0.003, 0.01, 0.03, 0.1, 0.3, & 1 Watts	0.3, 1.0, 3.0 & 10.0 Watts	0.3, 1.0, 3.0 & 10.0 Watts	3, 10, 30 & 100 Watts	3, 10, 30 & 100 Watts	3, 10, 30 & 100 Watts	3, 10, 30, 100 & 300 Watts
Response Time	< 1 second						
Accuracy	Analog ± 5% of full scale for all powers and wavelengths Digital ± 5% of reading, ± 2% least significant digits						±7%
Aperture Diameter	0.38" 0.97 cm	0.75" 1.9 cm	0.63" 1.6 cm	0.75" 1.9 cm	0.75" 1.9 cm	0.75" 1.9 cm	0.75" 1.9 cm
Head Diameter	2.75" 6.99 cm	2.5" 6.35 cm	2.5" 6.35 cm	1.99, 2.375"(1) 5.05, 6.03 cm	2.5" 6.35 cm	6.0" 15.24 cm	3.5" 8.89 cm
Active Sensor Area	0.10 in^2 0.64 cm^2	0.44 in^2 2.83 cm^2	0.31 in^2 2.0 cm^2	0.44 in^2 2.83 cm^2	0.44 in^2 2.83 cm^2	0.44 in^2 2.83 cm^2	0.44 in^2 2.83 cm^2
Max Power Dissipation	1 Watt	3 Watts	10 Watts	20 Watts(2)	30 Watts	100 Watts	150 Watts(3)
Max Power Density	200 Wcm^2			200 Wcm^2 (1300 Wcm^2 available)			1300 Wcm^2
Output Signal	10/100(4) mV/Watt	1 mV/Watt		0.1 mV/Watt			Switchable 0.01/0.001 mV/Watt
Battery Operation	(2) Duracell MN1604, 9V or equivalent						
Battery Lifetime	≥ 200 Hrs.						
AC Operation (Optional)	+9 VDC at Console, 120 VAC 50/60 Hz, 220 VAC 50 Hz Use Coherent AC Adapter only, for 110 V use PN 4001-0156, for 220 V use PN 4001-0158						

1. Head diameter, heatsink mounting plate diameter. 2. Must be mounted on heat sink (customer supplied, 40 sq. in. min.).
3. Intermittent duration (see chart). 4. LaserMate 1: min. power resolution is 50µW; min. detectable power is 300µW.



LaseMate 150 Power Duration

Trouble Shooting

Problem	Probable Cause	Solution
Display does not turn on	Dead battery or AC Adapter not plugged in	Plug in AC Adapter or replace batteries with Duracell MN1604 or ID 1604 9V batteries or equivalent
	Defective selector switch	Call service
Unit does not zero	Defective zero adjustment	Call service
	Low batteries	Replace
Needle has excessive overshoot	Response pot is incorrectly adjusted	Adjust pot with screwdriver provided

Spare

Item	Part Number
Analog out adapter, male RCA to female BNC	33-1520
Screwdriver, response pot adjustment	33-1231
Carrying case	33-0555
Small detector head stand	33-1447
Large detector head stand	33-1454

Warranty

The seller warrants to the original Buyer each item manufactured by it to be free from defects in material and workmanship for a period of time and under such conditions as specified in the Seller's warranty for the individual product, or for twelve (12) months from delivery if a warranty for the individual product is not specified. Major sub-systems manufactured by other firms but integrated into the Seller's systems are covered by the original Manufacturer's warranty. The Seller's liability under valid warranty claims is limited to repair or replacement at the Seller's plant or the Buyer's location, all at the option of the Seller.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED AND SHALL BE THE BUYER'S SOLE REMEDY AND THE SELLER'S SOLE LIABILITY ON CONTRACT OR WARRANTY OR OTHERWISE FOR THE PRODUCT. THE SELLER'S DISCLAIMS ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR PURPOSE.

All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, must be received within the applicable warranty period by the Seller, and shall be subject to the terms and conditions stated herein. Such claims should include the product serial number, the date of shipment, and a full description of the circumstances giving rise to the claim. Before any products are returned for repair and/or adjustment, authorization for the Seller for the return and instructions as to how and where these Products should be shipped must be obtained. Any product returned to the Seller for examination and/or warranty repair shall be sent prepaid via the means of transportation indicated as acceptable by the Seller. The Seller reserves the right to reject any warranty claim on any item that has been shipped by non-acceptable means of transportation. When any product is returned for examination and inspection, or for any other reason, the Buyer and its shipping agency shall be responsible for all damage resulting from improper packing or handling, and for loss in transit, notwithstanding any defect of non-conformity in the Product. In all cases, the Seller has sole responsibility for determining the cause and nature of failure, and the Seller's determination with regard thereto shall be final.

If it found the Seller's Product has been returned without cause and is still serviceable, the Buyer will be notified and the Product returned at the Buyer's expense, in addition, a charge for testing and examination may, in the Seller's sole discretion, be made on products returned.

Contact Information

In the event of system malfunction, contact Coherent Auburn Group.

For sales or service information about the **LaserMate™ Power Meter**, contact **Coherent Auburn Group**:

Sales	**(800) 343-4912**
Service	**(530) 888-5062**
Fax	**(530) 889-5353**

Coherent Auburn Group manufactures a full line of laser instrumentation, including the LabMaster Ultima laser measurement system, FieldMaster™ Power/Energy Meter, LaserMate power meters, ModeMaster™ Beam Propagation Analyzer, beam profilers, spectrum analyzers, and single frequency Helium Neon lasers, as well as LaserPure™ Heat Exchangers, PolarPure™ Chillers and standard and custom optical components and assemblies.

You may contact your local representatives or Coherent Auburn Group for further information regarding these items. Call **(800) 343-4912** and ask for one of our customer care specialists. Purchase orders may be places by phone, Fax or mail. Where fast delivery is desired, simply contact us at the number above.

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